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DIVISION OF OIL, GAS AND MINING

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May 7, 2001

TO: **Internal File**

THRU: Paul B. Baker, Project Team Lead

FROM: Jim D. Smith, Reclamation Specialist

RE: Deer Creek Reclamation Plan, PacifiCorp., Deer Creek Mine, C/015/018-AM99C-3

SUMMARY:

Energy West	Date of Action	Division	Date of Action
Initial Submittal - Revision of Reclamation Plan	May 26, 1999	AM99C	July 07, 1999
2nd Revision of Reclamation Plan	December 06, 1999	AM99C-1	March 13, 2000
1st Revision of Chapter 9	August 25, 2000	AM00D - combined with AM99C-2	November 03, 2000
3rd Revision of Reclamation Plan	September 21, 2000	AM99C-2	
4th Revision of Reclamation Plan	March 22, 2001	AM99C-3	This Document

AM99C-3 incorporated AM00D, the first TA of the Volume 9 revision, but subsequent TAs for revision of Volume 9 have been done separately and identified as AM00D-X. Comments and deficiencies on hydrology that were in AM99C-3, such as soil loss, that pertain to the revised reclamation plan rather than to Volume 9 are addressed in this TA.

TECHNICAL ANALYSIS:

RECLAMATION PLAN

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14

Analysis:

Water Quality Standards and Effluent Limitations

The operator has provided a water monitoring plan in Appendix A. The plan contains a commitment on page 177 that discharges of water from areas disturbed by coal mining and reclamation operations will be made in compliance with all Utah and federal water-quality laws and regulations and with effluent limitations for coal mining promulgated by the EPA and set forth in 400CFR Part 434. UPDES information is in Appendix B, Volume 9.

In Table 7-1, the operator has provided the values for the parameters used in RUSLE to estimate annual sediment contributions to Deer Creek from reclaimed watersheds. A 3.5" computer disc with the information used to determine sediment loss for the seven disturbed areas shown on Drawing DS-1795-D (Appendix R645-301-700-C) is included in Appendix 700-C.

The R-factor was determined using the data in the CITY database within RUSLE for the nearby Hiawatha area. Hiawatha is #44399 in the permittee's database, found on the 3.5" disc.

It states on page 7-3 that the estimation of the K-factor was based on average percentages of sand, silt, and clay from the soil analyses in Appendix R645-301-200-D (should be C). No data were available for percent rock-cover, so the average percent rock-cover at the recently reclaimed Cottonwood Fan Portal area (1999 Vegetation Report, p. 243) was used. The estimated K-factor used in the calculations was 0.225.

In determining the C-factor for the RUSLE calculations for the disturbed areas, maximum roughness was used because of the planned pocking, and entries for other ground covers such as rock fragments and vegetative residue were used conservatively because no data have been established.

The hillslope lengths and gradients used in determining the LS-factor for input to RUSLE are shown on Drawing DS-1795-D in Appendix R645-301-700-C (page 7-3).

The P-factor calculations in RUSLE yield not only the conservation planning value of the system (the P-factor itself), but also the sediment delivery ratio (SDR). Both values are calculated in RUSLE and shown in the RUSLE Spreadsheet Table. The P value in the table should be used for conservation planning, while the SDR (Sediment Delivery Ratio) should be

used to estimate off-slope impact. When R * K * LS * C are multiplied by P, the result is the A value (estimated soil loss) in the RUSLE Spreadsheet Table, while multiplying R * K * LS * C by SDR gives an estimate of the sediment yield (SY). Table 7-1 tabulates the input and results of calculating A

R*K*LS*C*P = A (estimated soil loss—page 7-2)

R*K*LS*C*SDR = SY (estimated sediment yield)

Diversions

Two ephemeral draws in Elk Canyon have been included in the channel design (DS-1780D) and final reclamation contour map (DS-1782D). Small ephemeral draws between the Terrace Enhancement Project area and Deer Creek may collect and convey water. The drainage areas of these small draws are not significant enough to require designed channels, but these are areas with the potential for gully formation. **NOTE**: the reference stations on DS1780D are measured along the channel length and do not correspond with the cross-section locations on DS1782D.

On page 104 of Volume 9, Deer Creek is described as an ephemeral stream based on observations by the operator; however, because the stream drains an area of more than one square mile, it is an intermittent stream by the definition in the Coal Mining Rules. Considered separately from the Deer Creek drainage, Deer and Elk are each an ephemeral drainage.

Design capacity for permanent, intermittent stream-channel diversions needs to be at least equal to the unmodified channel upstream and downstream from the diversion and able to safely pass a 100-year, 6-hour event. Small-scale cross sections of the unmodified channel immediately upstream and downstream of the site are on Drawing DS-1783-D, along with design cross sections for the reclaimed channels. Based on the NOAA Precipitation Frequency Atlas, 2.4 inches is the value for the 100-year, 6-hour storm event. Flows that would result from such a storm event were determined for Deer Creek Canyon, Deer Canyon, and Elk Canyon using STORM. Calculated watershed hydrographs are in Appendix 700-A, and results are summarized in Table 7-2. Five storm hydrographs were constructed: three for each of the drainages, one for routing Deer Canyon into Deer Creek Canyon, and one for routing all three drainages together. The designed drainage channel characteristics are summarized in Table 7-3 and channel design results are in Appendix 700-D.

Designs for channel transitions between the upstream and downstream natural channel to the reclaimed channels are shown on Figure 7-1A. Soft bioengineering methods for channel reclamation are described in on page 7-13 and designs are included in Figure 7-2A. These are to be used on three reaches where slopes are less than 5%. Dick Rol of the Division's AML section reviewed these plans and the following evaluation is based on his comments.

1. The design for using root wads in the transition areas looks acceptable. Having log ends pointing downstream is acceptable, but it is imperative that the operator plant enough sedges and willows behind the logs.

2. The value of placing anything in the middle of the channel is questionable. Placing wattles in the middle of the stream is a practice with which Dick is not familiar. Wattles are mainly intended for streambank protection, not for trying to establish islands. Using them to establish islands might work in some situations, but this doesn't appear to be a good place; nevertheless, it might be worth trying with one or two as an experimental practice.

3. Rocks in the middle of the channel will impede the flow and tend to create scour points that could become nick points.

4. The base material for the channel is a concern. Sieve analysis is not discussed, and probably cannot be known until the channel is actually excavated. The operator needs to commit to do sieve analyses during reclamation to help determine a stable final channel design.

5. A riprap channel with lots of vegetation on the sides would be a reasonable design option.

In response to Dick's comments, the permittee has stated a commitment to perform sieve analyses or similar analyses. The permittee also responded that Dick's comments were appreciated but that based on their evaluation, the stream channel as designed would be stable. The placement of logs, boulder clusters, willow wattles, etc. will direct flow towards the center of the channel in a meandering fashion. Willow wattles and U- or V-shaped weirs will provide flow dissipation to slow velocities and promote sedimentation. The permittee states more detailed information has been added to the Bioengineered Channels Section to help the reader better understand the construction process, but the additional information and the commitment to do sieve analyses could not be found in the Hydrology Section.

Designs for the channel transitions between the upstream and downstream natural channel and the reclaimed channel are on Drawing 7-1A in Appendix 700-B, and designs for energy dissipation basins are on Figure 7-3A. Locations for these structures are shown on Drawing DS-1780-D. **NOTE**: the reference stations on DS1780D are measured along the channel length and do not correspond with the cross-section locations on DS1782D.

The operator adjusted the channel location to minimize the potential for destabilizing the cut slope across from the Mine Office and Bath House. This area was predisposed to failure in 1992 when a tension crack was developed due to ponding water along the diversion ditch.

The operator provided riprap and granular filter material designs for the riprapped reclamation channels. Riprap gradation calculations are in Appendix 700-E. Calculations and assumptions that were used to determine Manning's 'n' for the riprap channel have been included on page 11 in the proposed reclamation plan.

Maps are certified. Hydraulic analysis, calculations, designs and drawings in the Hydrology Section are certified by John Christensen, Licensed Professional Engineer.

Findings:

The plan does not meet minimum regulatory requirements for this section. The permittee must provide the following in accordance with:

R645-301-121.200 - it states on page 7-3 that the estimation of the K-factor was based on average percentages of sand, silt, and clay from the soil analyses in Appendix R645-301-200-D: this should be Appendix R645-301-200-C.

R645-301-742.312, the permittee states in the cover letter that they will perform sieve analyses or similar analyses in conjunction with the construction of the bioengineered channels. The permittee also states more detailed information has been added to the Bioengineered Channels Section to help the reader better understand the construction process; the additional information and the commitment to sieve analysis could not be found in the Hydrology Section.

RECOMMENDATION:

Prior to approval, the requirements of the Coal Mining Rules must be provided as outlined above.

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